1.0 INTRODUCTION TO MASTERLINK

MasterLink is a comprehensive workflow management system. MasterLink, as its name implies, provides a new vital communication link between management and the worker. MasterLink connects the whole organization so they are able to achieve enterprise goals. MasterLink uses intelligent agents, policy (rules) and a standardized classification system to automate & simplify work.

1.1. Business Description

MasterLink is an intelligent agent enabled system. MasterLink uses policy (rules) to control the behavior of agents and resources managed by the system. The system and its agents react immediately to policy changes, thereby creating the "MasterLink" between the policy makers and the workforce. Managers will be provided with tools that measure the performance of the policies and the workforce to aid them in policy-making decisions.

1.1.1. The Opportunity

The Facilities environment defines a starting point on the road to creating full-scale cooperative work management systems that have universal appeal in the marketplace. Facilities are common to all businesses and cross horizontally through all vertical markets. The commercial facilities market in the United States today consists of over 218,000 buildings representing 40 billion square feet excluding military and heavy manufacturing facilities and over $325 billion dollars is spent annually to maintain those sites. Computerized Maintenance Management Systems (CMMS) attempt to make facility operations more effective but have no process in their design that assist ownership in protecting their capital investments. Typically they fail to meet user requirements in these key areas:

◊ Implementation costs;
◊ Management effectiveness;
◊ Return on investment;
◊ Ownership costs;
◊ Worker productivity;
◊ Worker satisfaction.

Current CMMS have evolved into very complex systems with features that have not successfully addressed the needs of their users. The completely automated system does not exist at this time. Vendors have created software that is data entry intensive and often intimidating. The management information provided is reactive and does not easily interface with other enterprise information systems. The focus has been on managing the data elements of the domain rather than the actual process of accomplishing work. Consequently, facilities owners and operators are economically burdened. They are paying a 50% or more premium on the cost of supervision, a 30% premium on skilled labor costs and a100% premium on data entry labor.

The conclusion may be made that the facilities market is in desperate need of new

information technology to improve physical asset management. The cost of facilities maintenance continues to rise, a means must be found to automate and control their management.

1.1.2.The Solution

MasterLink's Facilities Automation Simplification Technology (FAST) is a client/server application intended to manage the activities of skilled workers. The server contains all information about whatever needs to receive work (a machine) or whoever will do work (a person) and the rules (policies) governing their interactions. FAST can be deployed on a hand-held computer or PC workstation on a LAN and provides the worker with all relevant task information residing on the server via a telecommunications link.

MasterLink is designed to solve specific and chronic deficiencies in current CMMS. The compiling of fragmented industry information, creating new standards and applying the MasterLink FAST architecture will radically change the way skilled work management will be handled in the future.

The FAST architecture developed captures the intelligence functions of worker supervision in an automated system. The result is that resources have the necessary work information at the work point (point of need), predominately without human intervention. MasterLink achieves work simplification by better supporting the skilled worker while reducing or eliminating non-value adding supervisory and data input personnel from the work delivery process.

MasterLink is a new tool for handling skilled workforce management quality issues. It achieves resource optimization by focusing on the work point using a simplified set of policies as defined by the user company.

MasterLink optimizes resources by giving corporate management the ability to extract complex information that is presented in an easy-to-understand format in real-time. Policy level or operations level managers can easily manipulate the system to extract usable information. It is presented in ways that non-technical managers can readily comprehend. MasterLink allows management the freedom to demonstrate the effectiveness of policy changes prior to implementation by enabling extensive "what if?" capabilities. MasterLink tracks the effectiveness of policy decisions manager by manager.

MasterLink is a processed-focused software application that is utilized to manage the activities of stationary or mobile skill workers that:

◊ Reduces system implementation and customization costs by utilizing industry-specific standardized data definitions;
◊ Automates supervision (planning, scheduling, and dispatching);
◊ Links skill workers to all job information as required;
◊ Automates field data reporting in real-time;
◊ Enables management control of skill worker activities, based on policy. Policy is the

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meeting with sources of funds for both short & long term for product launch and market development.

1.3. Strategic Business Approach

The company has perfected a software product design that automates and simplifies the workflow management process. MasterLink connects management and the worker, as never before in real time, so the entire workforce of the enterprise can be optimized. MasterLink will produce and sell the product to companies who need to improve performance of their enterprise. The company provides a solution that removes the fundamental barriers to work process improvement by capturing supervisory functions in an automated system. MasterLink hides the complexity of managing skills, time, materials, schedules, etc. which allows management to focus totally on managing outcomes.

1.3.1. Workflow Process Expertise

MasterLink recognized without automating the supervisory process, management will not be able to optimize its capability and reach the highest level of productivity with its workforce. MasterLink's solution to this problem represents its foundational strategy for creating a product with capabilities that do not currently exist.
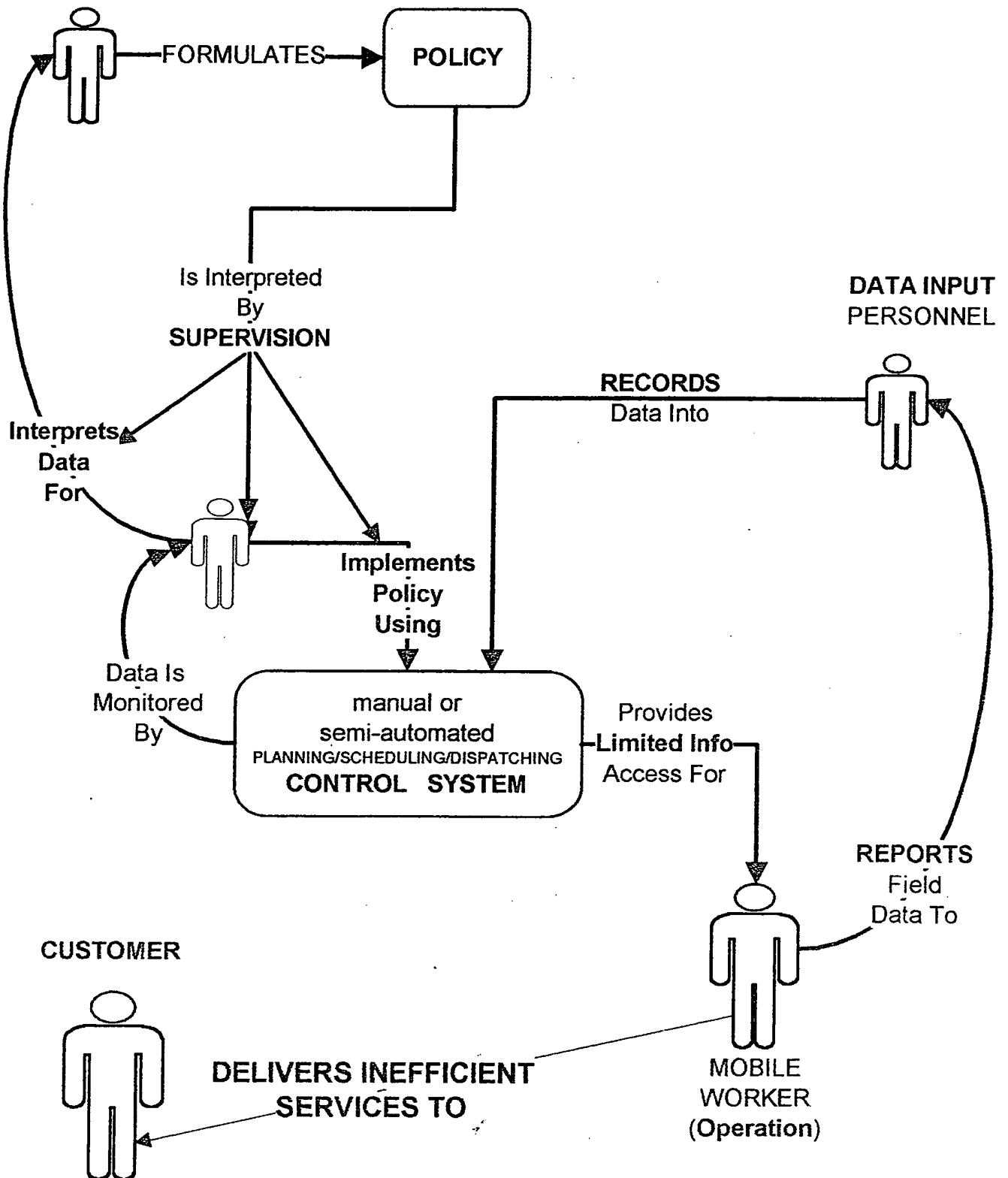
1.3.1.1. Understanding

Current workflow process systems include the following weaknesses:
♦ Management has limited access to out-of-date information;
♦ Management has little direct control of the workforce;
♦ Supervision adds limited value in coordinating the work activities;
♦ Policy implementations are proprietary to the supervisor doing the interpretations;
♦ Supervisors are the primary means of monitoring and interpreting field data;
♦ Data input is a non-productive cost;
♦ The mobile worker is not fully supported with information to make them more productive.

The following diagram shows multiple disconnects now faced in implementing policy decisions. Managers have a very difficult time effecting change in their company's workflow process because they do not have direct control of their workforce. Furthermore, managers do not have the immediate means to evaluate policy effectiveness.

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CORPORATE
MANAGEMENT

Current Workflow Process

FORMULATES → POLICY

Is Interpreted
By
SUPERVISION

**DATA INPUT
PERSONNEL**

RECORDS
Data Into

Interprets
Data
For

Implements
Policy
Using

Data Is
Monitored
By

manual or
semi-automated
PLANNING/SCHEDULING/DISPATCHING
CONTROL SYSTEM

Provides
Limited Info
Access For

REPORTS
Field
Data To

CUSTOMER

DELIVERS INEFFICIENT
SERVICES TO

MOBILE
WORKER
(Operation)

4

MasterLink overcomes these deficiencies inherent in current workflow process systems by giving users the tools to define their problem domain and the rules they need to optimize their resources.
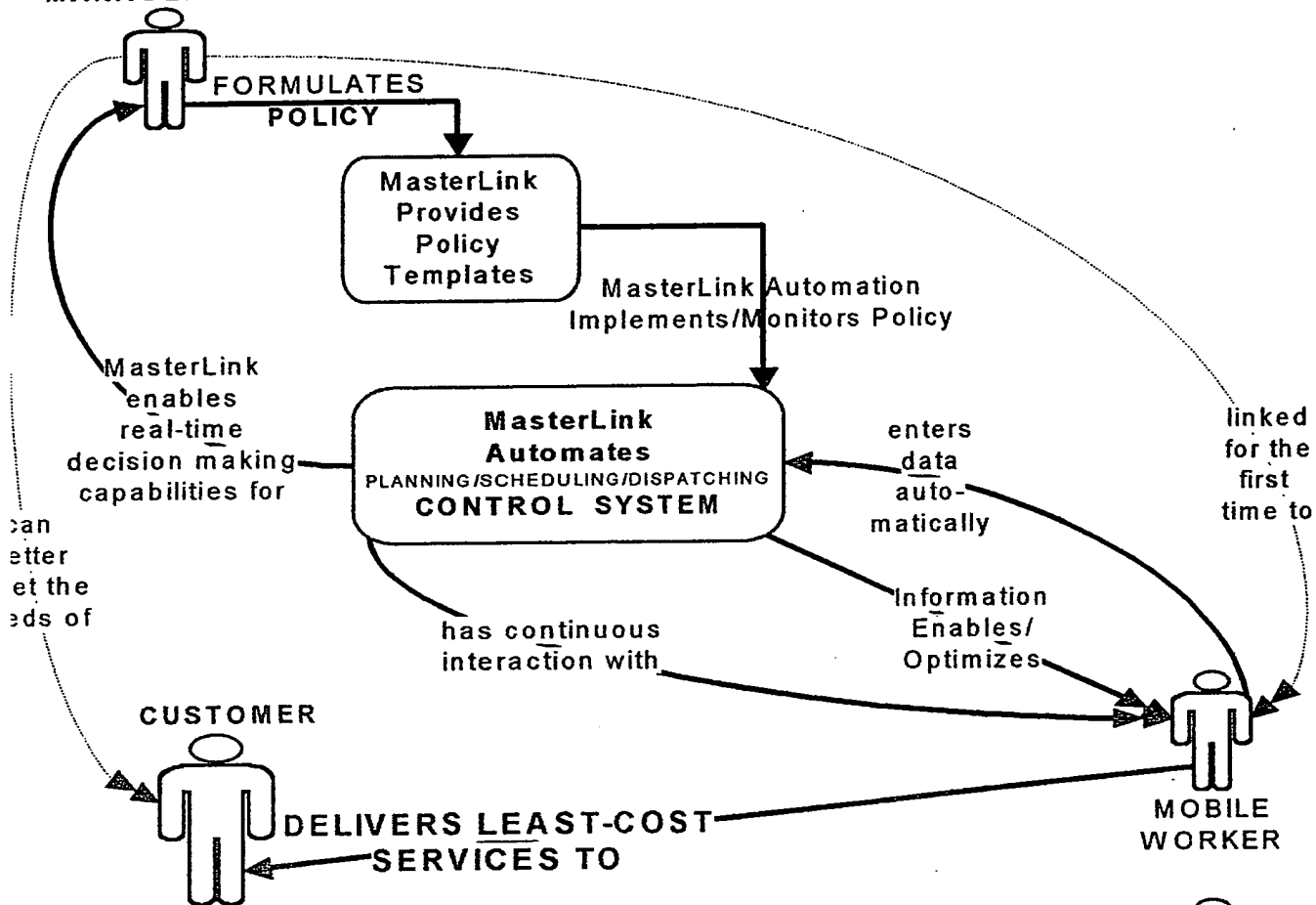
MasterLink enables users to focus on the process of work management through policy. Policy is a set of actions that are based upon alternative outcomes and are constantly changing. Policy defines the physical attributes of a given work domain and the rules which govern the interaction of the system participants.

Policy controls the behavior of system agents that in turn control the work force.

The "M a s t e r L i n k"
Work Force Optimization
Through POLICY
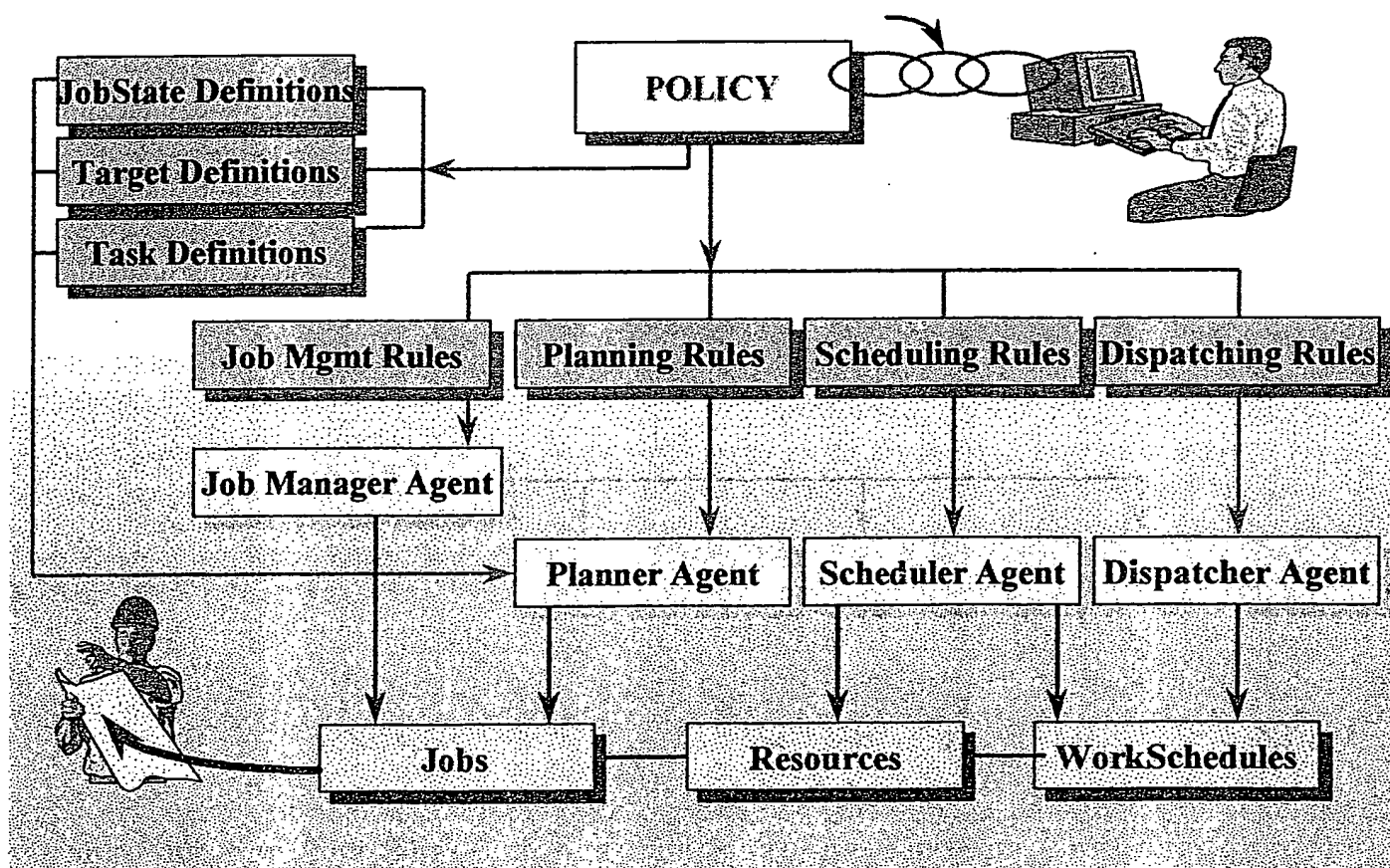
The following diagram shows how the policy gets implemented through the automation of the supervisory process.

MasterLink-Enabled Process Management

CORPORATE MANAGEMENT

FORMULATES POLICY

MasterLink Provides Policy Templates

MasterLink Automation Implements/Monitors Policy

MasterLink enables real-time decision making capabilities for

can etter et the eds of

MasterLink Automates
PLANNING/SCHEDULING/DISPATCHING
CONTROL SYSTEM

enters data auto- matically

linked for the first time to

Information Enables/ Optimizes

has continuous interaction with

CUSTOMER

DELIVERS LEAST-COST SERVICES TO

MOBILE WORKER

MANUAL ROLES ARE DIMINISHED

SUPERVISION

DATA INPUT

BENEFITS

Management: Controls Policy Formulation and Implementation, is able to maximize the productivity of the Mobile Worker, and is able to insure Superior Customer Service at **Least Cost**

Customer: Receives Maximum use of Facilities and Equipment

Mobile Worker: Provided with All Relevant Information Required to Perform Work Assignments, at the Jobsite
Data Input: No longer needed.

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MasterLink captures the supervisory functions of planning, scheduling and dispatching in an automated system. The MasterLink-enabled workflow process insures that any policy formulated by management will be implemented the same way each time. This is accomplished by the use of system agents. MasterLink agents are computer representations of human functions. Here are four examples:

Planner Agent – the planner agent queries all equipment records to determine which ones are due for service. The agent actions are controlled by the policy in deciding if all criteria such as time, cycles, etc. have been met. When management has determined that criteria have been met, the agent will create a work order.

Scheduler Agent – the scheduler agent keeps track of the resources needed to accomplish the work orders created by the planner agent or other users. The rules governing this agent will deal with issues such as location, skills and time needed. Once this agent's evaluation is complete, the work order will be placed on a worker's schedule for completion.

Dispatcher Agent – the dispatcher agent keeps track of the location and status of the work force. When orders are added to a resource's schedule, the dispatcher will determine if the worker should be interrupted based upon priority rules or allowed to finish the current assignment. The dispatcher agent knows what methods to use to contact the worker. It may decide to use a pager, for example, if the resource's handheld computer does not respond to messages.

The Job Manager Agent – this agent is the traffic cop for all other agents. When any system event occurs, internal or external, this agent evaluates rules determining which agent should respond. For example: The calendar changes from the 30th to the 1st, this agent may decide to wake up the planner agent to create new work orders for the new month.

These agent abstractions are the key to reinventing the workflow process. The primary obstacle to creating workable agents has been the ability to create agent's flexible enough to be constantly redirected without having to re-code the software. MasterLink's approach has shattered this barrier and is called domain definition.

There are two steps necessary to define a work domain in order to successfully design an automated workflow process system.

The first step is to define the physical aspects. MasterLink in cooperation with CSI delivers the facilities management domain a superset of the CSI long-established Masterformat indexing methodology standard in object library format. MasterLink has created a software framework based on a Masterformat capable of describing all of the physical attributes of the facilities domain.

Masterformat is a system of numbers and titles for organizing construction information into a standard order or sequence. Masterformat establishes a master list of titles and

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improvement on their return on investment. When MasterLink is compared to vendors supplying asset management software, advantages are even more pronounced. Its design and functionality goes well beyond CMMS capabilities. MasterLink provides an enterprise with a flexible and functional tool that provides a total business performance analysis for management. Mr. Philip Crosby a noted author and lecturer on Quality Management, has endorsed MasterLink as, "a computer era breakthrough that lets management manage, while the work force is fully utilized."

2.2.8. Current Product Industry Trends

CMMS asset management vendors construct their software in a data centric manner. David Berger states, " A CMMS cranks out reams of data for management to make more informed decisions."[4] Industry pundits state that there is a critical need for key drivers such as time, quality and cost to improve the process. To achieve these improvements management must evaluate the voluminous data that is a result of a data centric system. It requires more time for management to arrive at a decision point. MasterLink is a process centered system that filters and permits management to make business decisions in a more informed and timely manner. Most importantly, in real-time if required.

Keith Mobley states, "To get maximum benefits from technology, corporations must also change the way they do business and drastically improve the skill levels of their workforce."[5] MasterLink offers a process oriented software package, (non-data centric) that includes maintenance management as a module embedded in a total management system. The MasterLink design has the ability to measure, compare, and judge performance in real time.

An appraisal by Automation Research Corporation states, "The current environment is a classical Win-Win situation for both the users and suppliers of maintenance management solutions. The manufacturers still face major reengineering and rightsizing modifications and in the past two years, after having cut all other expenses to the bone, have recognized the advantages of an enterprise wide computerized maintenance management system."[6] A current industry trend reported by this same source is a movement toward client/server technology. These implementations generated 57% of CMMS revenues in 1995. ARC forecasts that the number of Windows NT server implementations would exceed UNIX by 1999. A notable trend is the movement toward open systems and the utilization of Object Oriented Technology (OOT). This advances the use of client/server applications.

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[4] Plant Services Magazine, "Continuous improvement of process flow around CMMS", November 1997
      Berger, David
[5] Plant Service Magazine, "Gaining tangible benefits from technology", January 1998
      Mobley, Keith
[6] Automation Research Corporation Market Studies, "CMMS Software Outlook Study",
      Copyright© 1997 ARC

2.3. *Barriers to Market Entry*

2.3.1. Highly Segmented Market

It is inevitable that MasterLink will be compared to 200 publishers of desktop and mid range CMMS systems, no one vendor dominates this highly segmented market. This segmentation and the number of competing vendors are an indication that the maintenance market is not being adequately served.

MasterLink will encourage this comparison. The company provides solutions to the problems inherent in CMMS. The design and functionality of MasterLink offers specific solutions to workflow and work process problems for facilities maintenance managers. Once established, the MasterLink Company will be in a position to dominate the facilities management market. This is further discussed in Marketing Strategies and Competition.

2.3.2. Customer Knowledge/Expectations

The management of facility enterprises is aware of the greater than 50% failure rate of CMMS implementations. All levels of these organizations are understandably skeptical of vendor claims. MasterLink's task is to convince top management of the ability of this system to resolve previous problems and disappointments. MasterLink will produce a demonstration package that substantiates all claims made regarding performance and suitability.

2.3.3. Mobile Worker Attitudes

Personnel at all levels have been disappointed by software systems that failed to provide information required to complete tasks, assignments and jobs in an efficient and cost effective manner. This has resulted in serious attitude problems and resistance to change. By design, MasterLink provides information to and from the point of work so that everyone knows what to do and how to do it. Everyone in the organization knows how well he or she is doing relative to expectations. MasterLink establishes an environment that permits change in workflow process and makes worker attitude adjustment easier. MasterLink has the ability to measure work performance and results. It provides a clear statement of contribution by and from every worker. Worker rewards can be distributed on a rational performance basis.

2.3.4. Product Considerations

Another barrier to this market is the complexity of the maintenance management domain itself. The simple act of creating a work order can involve hundreds of transactions. When skill, time, location, material, and many other variables are included, a system has to be very well designed to function properly. Because of these variables, CMMS design and architecture become very complex most often requiring patches. It is often necessary to hire senior information technology talent. This significantly drives up production and ownership cost for a paper heavy system.

Current CMMS systems are designed to address maintenance and maintenance management requirements. CMMS sales and market approaches target middle
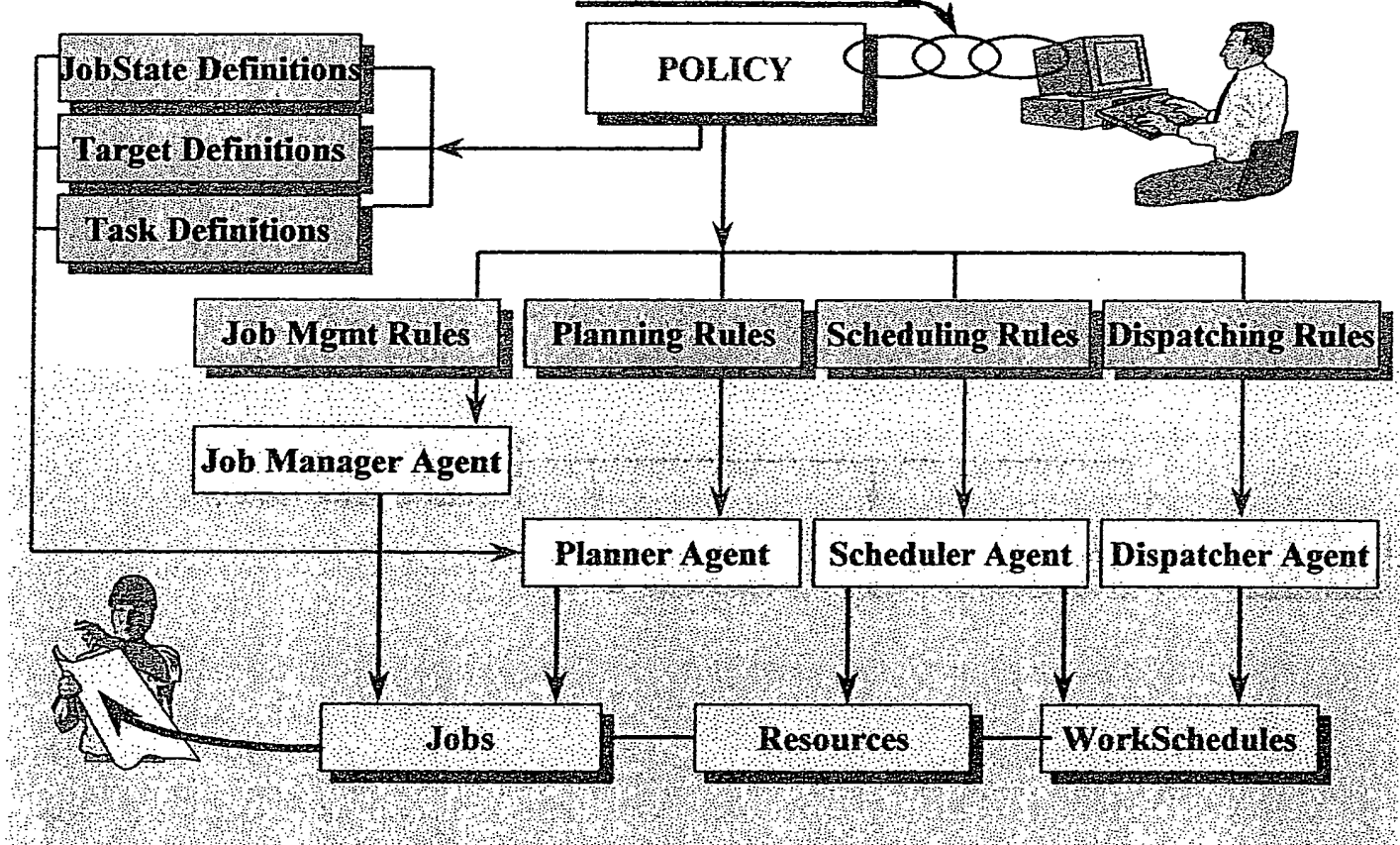
The question is, how do we overcome these deficiencies? Users must be given the tools to define their problem domain, and the rules they need to control their resources.

MasterLink enables users to focus on the process of work management through policy. Policy is a set of actions based upon alternative outcomes, and are constantly changing. Policy also defines the physical attributes of a given work domain and the rules which govern the interaction of the system participants.

Policy controls the behavior of system agents, which in turn control the work force.

Work Force Control
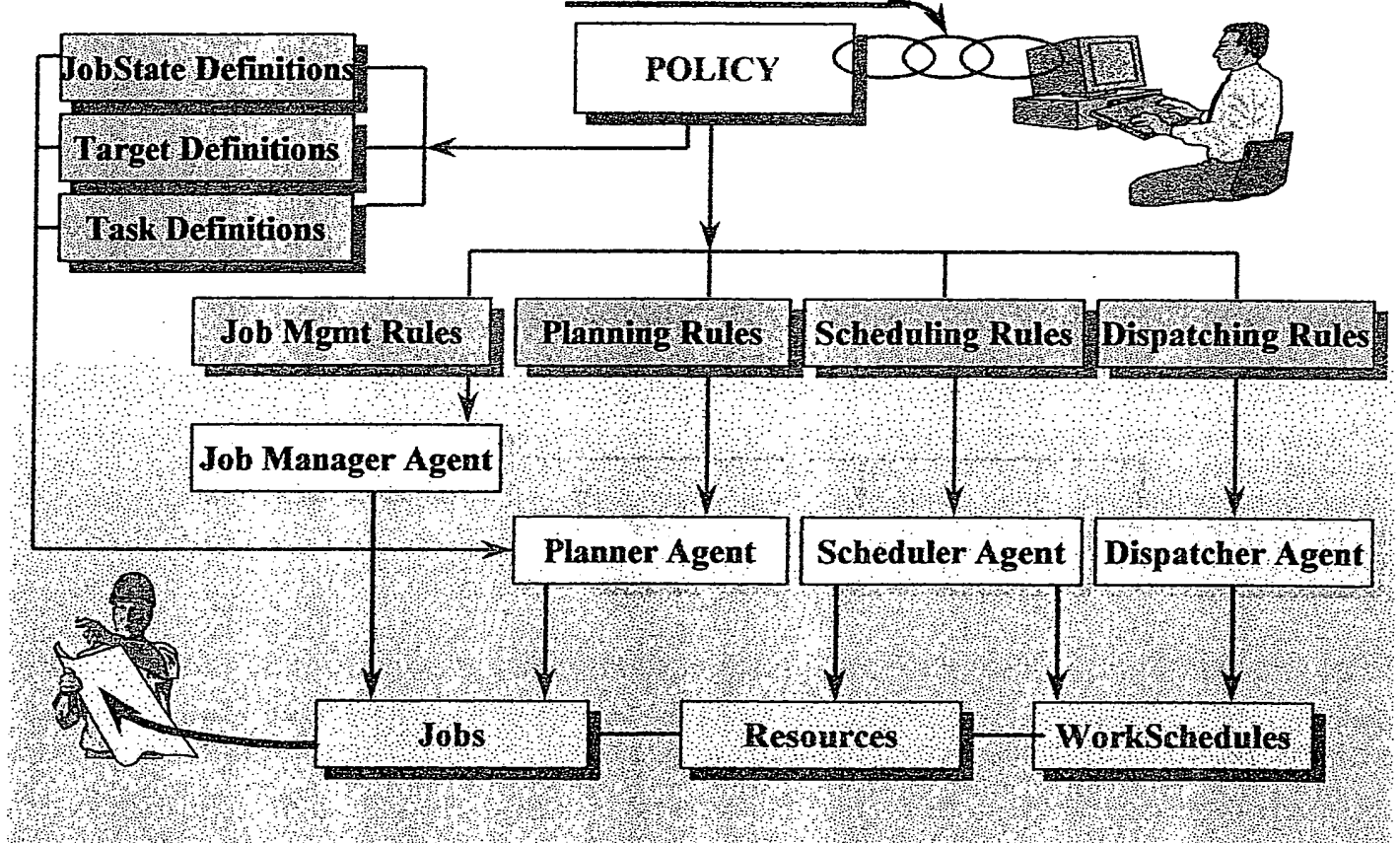# Through POLICY
The "M a s t e r L i n k"

The following diagram shows how the policy gets implemented through the automation of the supervisory process.

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Work Force Control
Through POLICY
The "MasterLink"

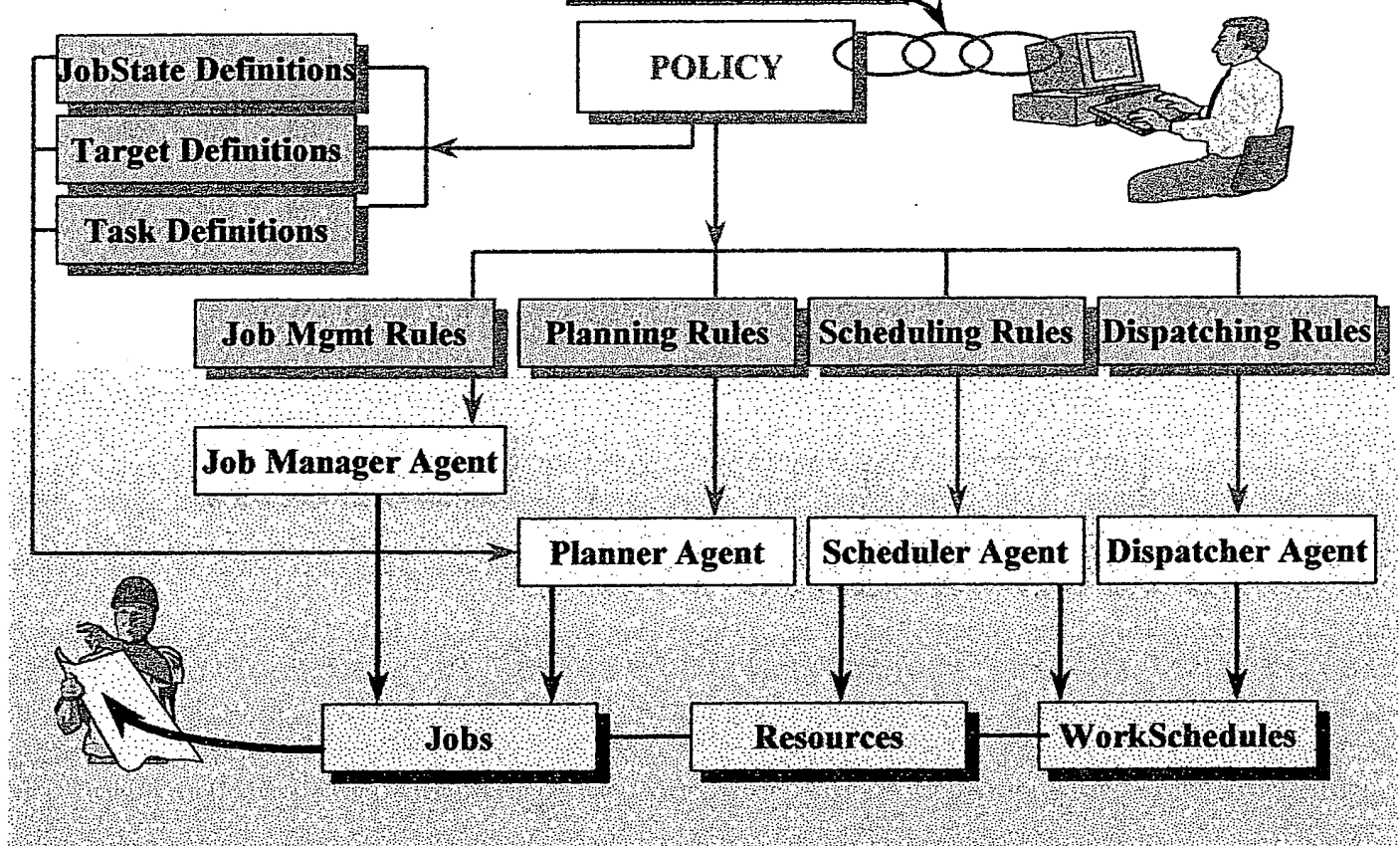The following diagram shows how the policy gets implemented through the automation of the supervisory process.

Satellite Nature of Building Management
MasterLink will maintain the inter-office connectivity network for the client.

Tradesmen's Resistance to Change
MasterLink provides the mobile maintenance worker with tools to make him/her more productive. Access to task appropriated information improves worker satisfaction.

Field Device Complexity
MasterLink provides hand held units made easy to use like an ATM. Simple input and simple output.

Negative Executive Mindset
Demonstrate MasterLink's ability to improve all aspects of the enterprise. This includes better decision processes, improved employee moral, increased productivity, improved quality and greater profitability.

Proving Value Delivery
The United States Bureau of Labor Statistics reports that the majority of industries, the ratio of supervisors to workers are approximately 1:10. They reported the following average costs for various workers including benefits are:

Supervisors $40,000
Workers $30,000
Data Clerks $20,000
Managers $50,000

Obviously, different industries will have different cost structures. The key element in selling our product is being able to prove that our product actually delivers real economic benefit to our customers. The following table shows an example of how MasterLink savings can be calculated.

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MasterLink Economic Benefit Analysis

Typical 30 Man Crew
Reporting to 1 Maintenance Manager

Maintenance Personnel	Without MasterLink	Costs	With MasterLink	Costs
Maintenance Manager	1	$50,000	1	$50,000
Mobile Worker @30K/yr	30	$900,000	24	$720,000
Data Clerks @20K/yr	1	$20,000	0	-----------
Supervisors @40K/yr	3	$120,000	0	-----------
Personnel Totals:		$1,090,000		$770,000
Cost to deliver Technology		-----------		* $144,000
Total Costs:		$1,090,000		$914,000
NET SAVINGS			$176,000	

Cost to deliver technology $500/mo/man includes hand-held, server time, communication link, and software.

The reasons MasterLink can deliver this kind of savings are simple:

♦ MasterLink captures the intelligence of the supervisory function;
♦ The ratios of supervisor to worker will be reduced from 1:10 to 1:30 or more;
♦ The organization can re-deploy those resources to focus more on the customer or eliminate the ones no longer needed.

In addition, MasterLink is designed to capture field-generated information. This reduces or eliminates the need for data clerks.

Once implemented, MasterLink will identify non-value adding manual functions through the use of intelligent work reception eliminating unnecessary manual functions.

The issue of value delivery will set MasterLink apart from the competition. We will articulate through the use of a demonstration package how MasterLink manages workflow process and automates supervision. MasterLink clients will be provided with persuasive demonstration of savings and cost control currently not available in competitive products.

2.4. Customer Considerations

Current work automation systems intended to make work management more effective have failed to assist ownership in achieving enterprise objectives by not meeting requirements in the key areas listed below.

2.4.1. Implementation Costs

There is a tendency for companies to perceive that their maintenance management problems and requirements are different from everyone else. CMMS vendors accommodate this attitude by implementing entire numbering and/or coding schema in order to define basic information requirements. This can further complicate system management and add hundreds of man-hours to the implementation process. Once installed these systems are difficult to maintain and often error-prone. Definitions become proprietary to system operators or consultants and dependent upon personal design philosophy. The methodology used may not accommodate future changes in enterprise objectives or market conditions.

2.4.2. Ownership Costs

Current systems do not address fundamental management procedures involving skilled workforce. Identifying non value-adding personnel is not a feature of CMMS. In the absence of automation, the system is not sufficiently streamlined and frequently retains a much higher human resource content than necessary. This would be true at both the supervisory and point of work levels. CMMS annual maintenance costs reflect the complexity of the system. These are typically 15 – 20% higher than the software licensing fees. Customizing is another expensive element and one not usually addressed by the owner company. Unless sophisticated programming skills exist in the IS department, add-on personnel costs for program management can be a significant additional expense.

2.4.3. Worker Productivity

Today's systems have not met the needs of the skill worker. Like the paper-based systems before them, current automated solutions are focused on data and not on process. The result has been a distinct lack of innovation in mobile work process management. Information conveyed to workers at the point of work fall short of useful process content. Mobile worker productivity increases are made more difficult in the absence of suitable, simple and readily accessible information to and from the point of work. Left to traditional methods that are not suited to today's business models resulting in extraneous costs.

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2.4.4. Work Quality

Quality is meeting customers' expectations and conformance to requirements. Mr. Berger states, "Quality – For some companies, the biggest opportunity for improving processes is to do it right the first time."[7] MasterLink provides the right information at the point of work to do the work right the first time. This eliminates customer dissatisfaction, costly rework and allows timely delivery of products or services. Current systems do not offer this.

2.4.5. Worker Satisfaction

Current systems fail to provide workers with essential information at the point of work that is required to efficiently complete their tasks assigned. Lack of measurement capability fails to provide workers with a sense of job performance and enterprise contribution. This severely limits worker satisfaction. Currently workers spend a lot of time waiting for approvals, parts, instructions and waiting for others to respond to a request to fix a problem. Keith Mobley states, "There are a myriad of reasons for the apparent lack of effort of the work force. One of the major reasons is they do not understand their role. Too many plants have poorly designed job descriptions. A second reason is the typical employee does not have the tools needed to perform the job. Few employees, no matter what their position, have the basic experience, skills, tools required to fulfill their jobs effectively."[8] MasterLink by informing and training, as necessary, solves both of these problems and improves worker morale.

2.4.6. Management Effectiveness

The most difficult challenge in managing mobile work forces is the complexity of the domain. Managers are faced with thousands of options that must be constantly modified as business conditions change. Different levels of the enterprise are implementing their own version of what they think executive management wants. This occurs all the way down the corporate ladder. Consequently, achieving predictable results are almost impossible. Current ad hoc reporting capabilities do not equip corporate management with adequate information to make sound business decisions. Translating trend data into a new work strategy is nearly impossible. The result is more monitoring than managing and high-level managers remain totally dependent on the in-line managers to interpret data and recommend new tactics. David Berger states, "The difficulty is, however, is prioritizing improvements and finding time to implement the more significant ones."[9]

A compelling observation about management effectiveness is the fact that the CMMS industry does not address the issue of skill premium. Skill premium is defined as the amount of excess skill delivered to accomplish a given set of tasks. For example: A class "A" electrician (A being the highest skill) being dispatched to do work that could

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[7] Plant Services Magazine, "Continuous improvement of process flow around CMMS", November 1997
Berger, David

[8] Plant Services Magazine, "Barriers to plant performance real or imagined?", July 1997
Mobley, Keith

[9] Plant Services Magazine, "Continuous improvement of process flow around CMMS", November 1997
Berger, David

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be done by a class "C" electrician. Automation of supervision and this area of work management offer the greatest potential for enterprise savings.

MasterLink tracking policies individually or enterprise wide equips its customers with tools to help them address skill premium issues. The net effect will be the ability to improve productivity and optimize worker skill delivery.

2.4.7. Return on Investment

Current systems possess limited ability to measure performance in any of the standard operating categories. Customers expect a proper rate of return on investments. Currently, 50% of the CMMS installations fail.

MasterLink provides a return on investment in three specific ways:
◊ Annual savings of 15% – 30% on the cost of mobile workforce labor;
◊ Annual savings of 25% - 50% and more on the cost of supervision for the mobile workforce;
◊ Annual savings 3% - 5% on data center costs.

The magnitude of the cost savings potential will result in the amortization for an enterprise investment in MasterLink in less than one year. Consider a typical organization with 100 mobile workers and 10 supervisors. MasterLink and a data center cost of $750,000/year. Following installation and implementation of MasterLink this profiled organization would realize a cost savings of $590,000 the first year. The more conservative percentages were used for this calculation. It becomes evident that billings from MasterLink to an end user in the $500,000 range would result in amortization for the end user in less than one year.

2.5. Ease of Use

MasterLink is easy to use because it is easy to understand. MasterLink reduces the complex world of work into three components of targets, resources and jobs. Targets are the objects of work. Resources are the things necessary for work to be executed such as skilled workers, time and materials. Jobs are the collections of tasks to be applied to targets and are assigned to resources. Everything is defined and operates on the principle of these simple relationships. MasterLink is a tool for the skilled worker, support personnel and management that delivers real-time information, automates & simplifies work and work management.

In computer system terms, ease of use refers to how the user interacts with a system to get the system to perform some function on the user's behalf. In addition to the more visible aspects of how the screens appear and operate, this has a lot to do with how the underlying system is designed.
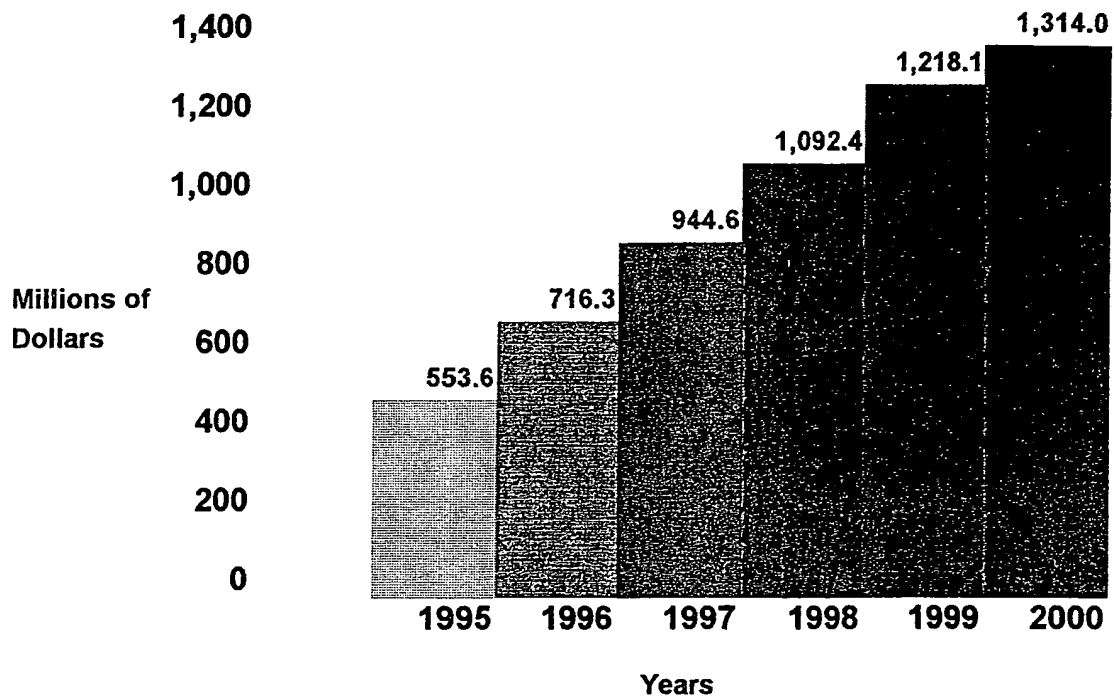
The company recognizes that the key to realizing value and benefit from MasterLink is in its use and acceptance by skilled workers. We intend to engage in on going market research to insure that we are providing the functions to this group of users that they want us to provide. At the time of this writing, the user interface on the worker side is

analogous to an Automated Teller Machine (ATM) that banks use. Each screen is plainly laid out, with a few options and simple navigation to additional interfaces. In addition to the screens themselves the device plays a role in the usefulness of a solution. For mobile workers the device will be "ruggedized", as appropriate for the job.

Another way in which MasterLink is easy to use has to do with the use of Metadata. One example of this is the work target classification system that in the facilities domain is based on the CSI standard. This allows for quick and minimal data entry to capture the details of a particular work target because it can inherit so much from the classification system. MasterLink exploits this use of Metadata in many facets of the system initialization phase.

Policy and rules are guidelines that assist in directing the enterprise to arrive at efficient and logical workflow process conclusion. Policy level or operational level managers can easily manipulate the system to extract information. Information is presented in ways that non-technical managers can understand. MasterLink provides management the freedom to change operating policy as needed and track the effectiveness of policy change decisions manager-by-manager. The system agents' react to the existing policies and rules and changes introduced by management to alter the behavior of the enterprise in a positive fashion.

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2.6. CMMS Market Projections through 2000

**CMMS MARKET
PROJECTIONS**

Millions of
Dollars

1,400
1,200
1,000
800
600
400
200
0

553.6   716.3   944.6   1,092.4   1,218.1   1,314.0

1995   1996   1997   1998   1999   2000

Years

2.7. *Future Markets*

The core foundation of MasterLink centers on Facilities Management. Once the MasterLink core is constructed, it is reusable in other domain applications. Estimated reusability is 75% to 85%. The migration of MasterLink into other work domains will proceed in an orderly fashion. The initial market efforts will include hospital facilities. Market analysis studies indicate that none of the software vendor offerings for use by the medical industry including home healthcare remotely resemble the workflow management process capabilities of MasterLink.
See Appendix B. Faxed.

2.7.1. HealthCare

Sales figures for Home Health Care for the year 1997 were $275 million. The total IS expenditure for the HealthCare industry was $3 billion in 1997. This does not include many of the supporting services industries. HomeCare is expected to grow to $303 million in 1998 and $336 million in 1999 and continue growing at 20% annually. The major deficiency in all of these offerings is the inability to get information to and from providers at the point of work. None of the current systems are able to notify all involved personnel of a need to change treatment protocol. This inflexibility introduces wasted costs and inefficiencies in work assignments. None of the above vendors have a solution to this problem.

Recent trends in HealthCare billing and payment practices are moving to per case or episode pay on a given protocol basis. Pricing is in a free fall and they have to run operations more smoothly as there is no margin for errors. HealthCare providers now require sophisticated methods to control costs. A particularly strong need for such cost control is already at a critical stage in all areas of HealthCare. At this time, there is no MasterLink workflow management process that includes a policy and information distribution system available for mobile healthcare workers.

HealthCare work domains are among the largest market opportunities for MasterLink. Positioning MasterLink in this market will require domain experts to assist the company in successfully penetrating medical application fields. We have identified the top ten healthcare system companies and have collected significant market information on the two leaders HBOC in Atlanta, Ga. and Shared Medical Systems in Malverne, Pa.

2.7.2. Communications

Note in the above chart that there are 256,400 mobile workers in the telephone industry and another 39,000 mobile workers in cable TV installation and service. The MasterLink organization has considerable benchmark strength in approaching this particular industry segment. We will continue to survey and analyze technological developments in this industry. It is fundamental to MasterLink's ability to provide information to and from the point of work.
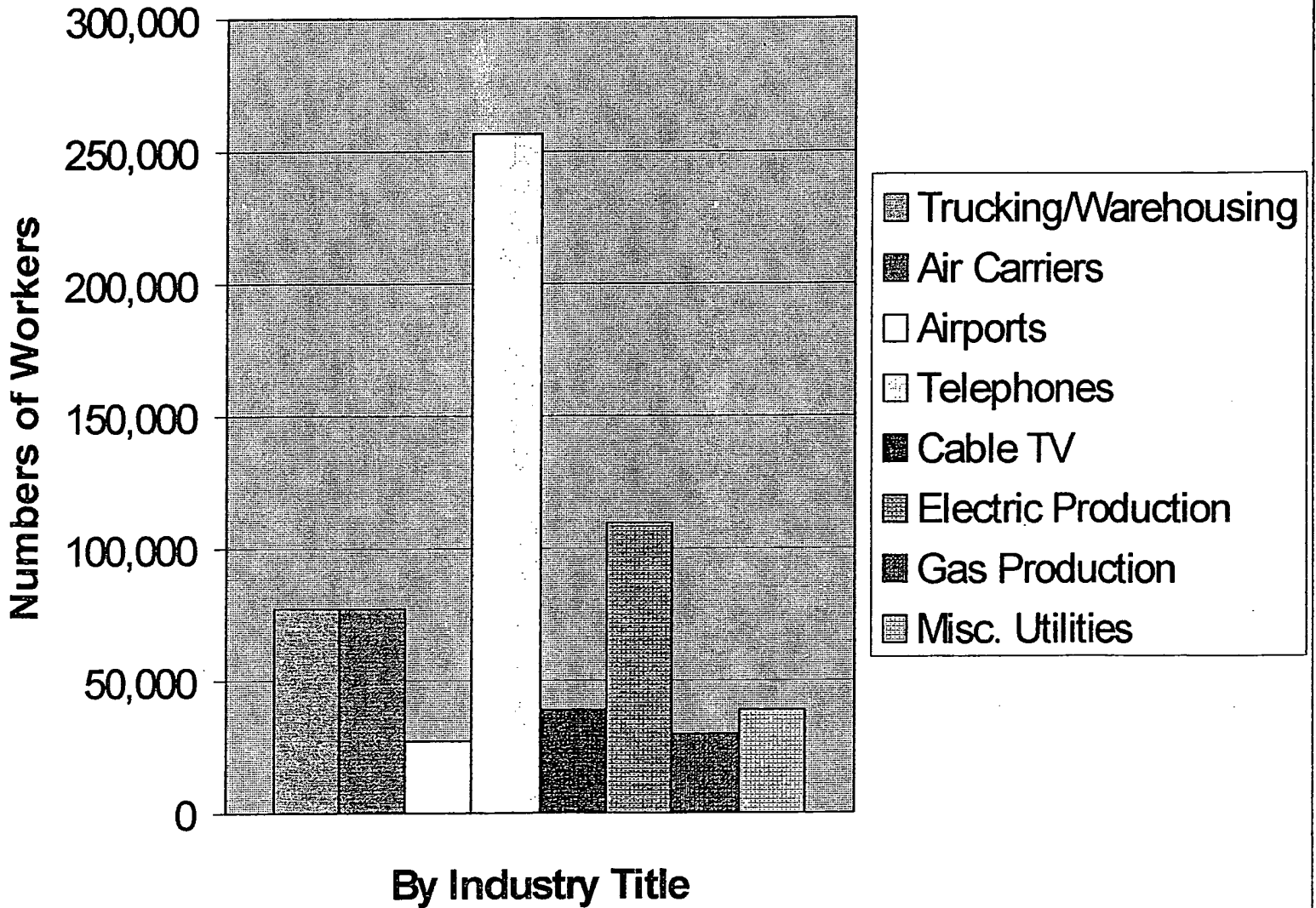

2.7.3. Utilities

Another opportunity for MasterLink is in the utility domains. The gas utility industry has been deregulated and the electrical utility industries are in the process of being deregulated. In the past, these utilities petitioned the public service commission in the state of operation to obtain rate increases. Utilities in essence were guaranteed a profit. Although the utilities were required to justify cost increases, rate increases were rarely turned down. Competition is the new order and the ability to control costs and manage workflow processes will determine who survives. MasterLink has made a number of conceptual presentations to Peco, Electric Power Research Institute Maintenance & Diagnostics Corp. (EPRI M&D), Orlando Utilities Commission (OUC), Florida Gas and Enron Corp. As deregulation of the utility industries accelerates the need to control costs and remain competitive will become paramount as a management policy.

There are now over 175,000 mobile workers employed by the utility industries the U. S. Mechanics/Installers/Repairers and Utilities /Trans Segment chart. Faxed.

Extensive contacts including meetings and presentations with the EPRI M&D, Enron & Florida Gas, OUC, and Florida Power have confirmed the need for MasterLink's workflow management system to control costs and operate efficiently. They need a two-way real-time communication system at the point of work for their mobile work force.

The following chart shows the worker distribution in the utilities/transportation segment of the skilled mechanics/repairers/installers labor market.

Utilities/Trans Segment - 656,417 Workers

Numbers of Workers

300,000

250,000

200,000

150,000

100,000

50,000

0

▨ Trucking/Warehousing
▨ Air Carriers
☐ Airports
▦ Telephones
■ Cable TV
▦ Electric Production
▨ Gas Production
▦ Misc. Utilities

By Industry Title

3.1. Target Markets and Market Segments

These three targets will be our launching pad:

- MasterLink will focus on facilities maintenance management that is the software core for its comprehensive management system. The need for more sophisticated systems makes it a natural choice. This is covered in more detail in The Company's Markets.
- Lockheed Martin is a target for facilities management and other domains.
- Medical Facilities such as Shands Hospital and Columbia/HCA. Shands is a member of The University Health Consortium its members consist of seventy of the largest university/hospital/ medical schools in the country.

As the core product is completed, the target markets will expand vertically and to other domains, as the company is able to develop strategic partnerships to handle them.

3.2. Pricing & Value

MasterLink delivers a comprehensive workflow management system beyond offerings of CMMS. Our niche will be in the middle between the low end, DataStream customers who pay between $5,000 - $10,000 for the product and at the high end, JD Edwards customers who pay $500,000 - $1,500,000 for an enterprise system. There is room for an aggressive selling program directed toward the middle of this market.

MasterLink will base pricing on value delivered to their clients. The complete system price will range from $250,000 - $750,000. Component modules will range from $25,000 - $75,000. Pricing will vary due to differences in the industry domains MasterLink will serve and the systems required.

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3.2.1. Industry Specific Value Calculations

Each industry has its own cost structures related to work force management. For example: In the electric power industry, according to the Electric Power Research Institute, the supervisor ratio is 1:10 and the average supervisor costs (salary + benefits, etc.) is $70,000. The average technician costs $50,000, and the average data clerk costs $30,000. Following is a value delivery potential calculation for a whole industry.

Maintenance Personnel	Without MasterLink	Costs	With MasterLink	Costs
Mobile Worker @50K/yr	100,000	$5,000,000,000	75,000	$3,750,000,000
Data Clerks @30K/yr	2,000	$60,000,000	1,000	$10,000,000
Supervisors @70K/yr	10,000	$700,000,000	6,000	$36,000,000
Personnel Totals:		$5,080,000,000		$3,796,000
Cost to deliver Technology		————		$450,000,000
Total Costs:		$5,080,000,000		$4,246,000,000
NET SAVINGS			$834 Million or 16%	

Applying the same logic as used with the 30-man crew chart, a calculation for an entire industry can be calculated. By doing such calculations, MasterLink can discover which industries have the highest cost structures to manage. Our prices will be higher in industries where we will deliver the greatest value.

See Appendix C for the value added delivery profile of a potential MasterLink user.
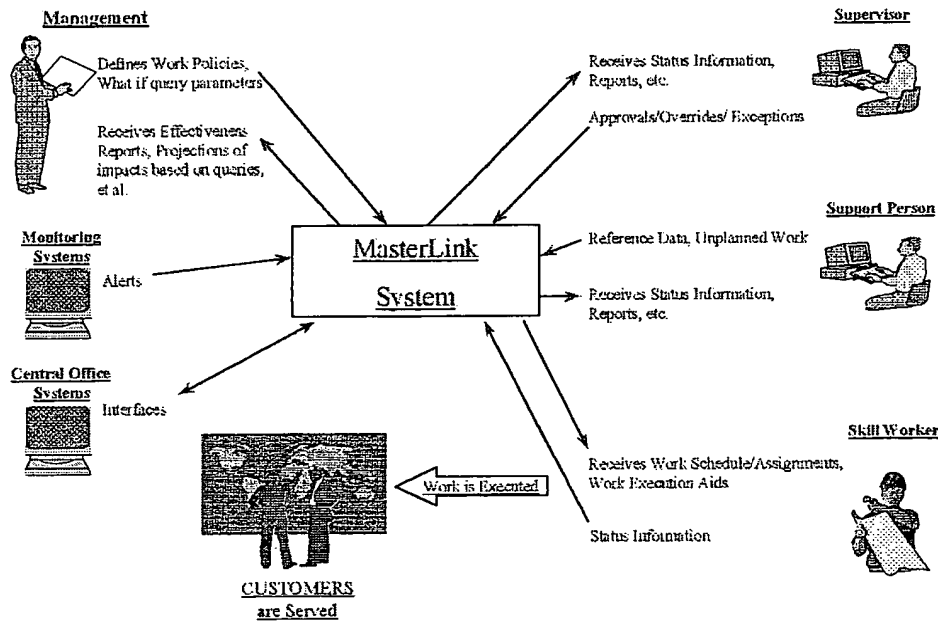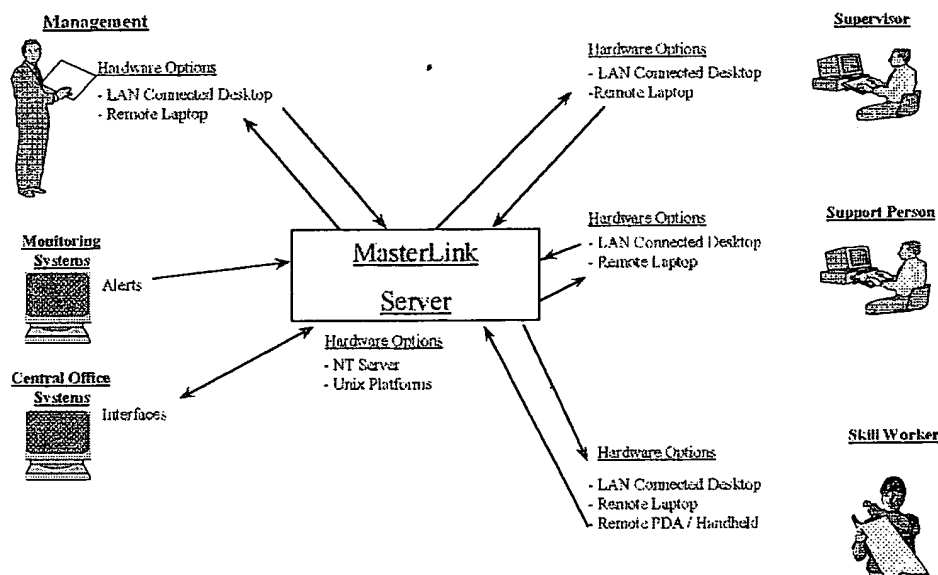
3.2.1.1. System Mgt. Comparison – Planned Maintenance Activities

The following table shows how MasterLink will improve the logistical process of handling work orders.

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System Comparison – Weekly Supervisory Activities
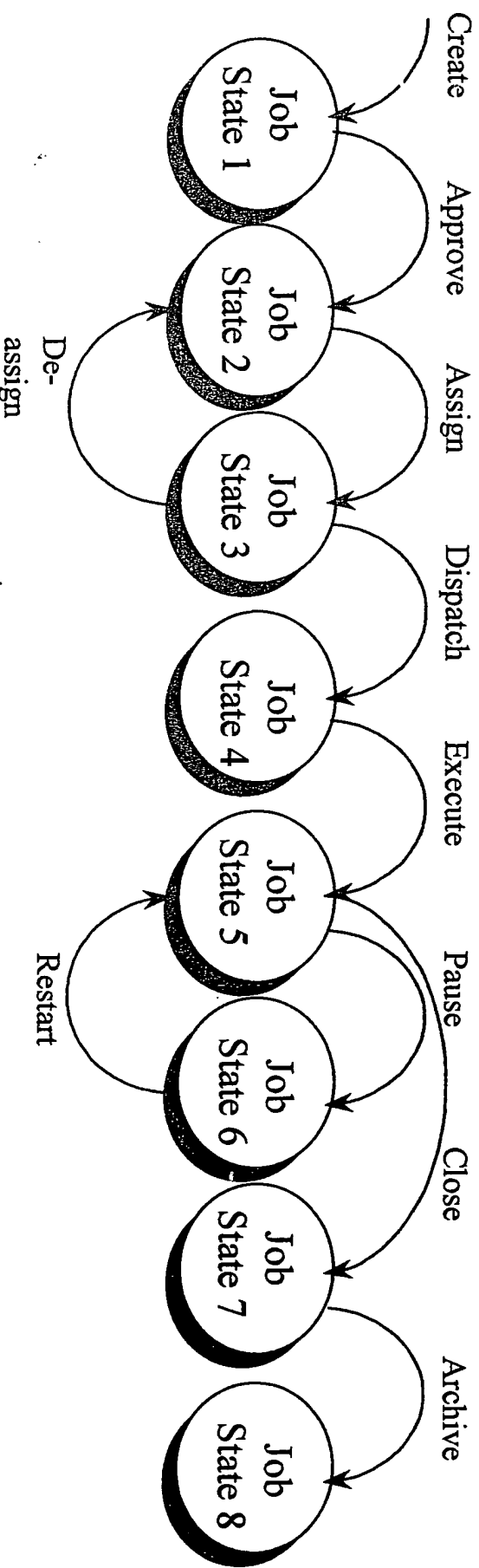### (30 man crew w/3 supervisors & 1 data entry clerk)

ACTIVITY	Hrs w/Current Systems	Hrs. w/MasterLink	CURRENT LIMITATIONS	MASTERLINK ADVANTAGES
Produce a List of Things Requiring Work	.50	.50	Functionally the same	None
Produce Daily & Weekly Schedules for Individual Workers	40.0	2.0	This process requires tedious manual calculations to distribute the workload amongst workers	This is a fully automated process that optimizes available resources by applying the right skill level based on a wide variety of factors.
Dispatch Daily Work Orders	30.0	1.0	Work Orders must be printed and sorted for each individual worker. Orders must then be sorted by day and worker and assigned a priority sequence, then manually distributed.	MasterLink delivers all job schedule/task information automatically to each worker's hand-held computer unit.
Work Order Dispatch/Re-Assignment	10.0	1.5	Individual daily schedules must be reconfigured at the end of each shift to account for uncompleted work and unplanned events that have altered schedules.	MasterLink automatically reconstructs worker schedules a the end of every shift, or more often as required. Human intervention is limited to handling exceptional situations.
Work Order Execution	0.0	0.0	Worker arrives with minimal task information and no easily accessible job information	MasterLink enabled workers are provided with various kinds of data, including: historical data, situation assessment aides, diagnostic advice, and more. All at the touch of an ATM style interface.
Work Order Closing	50.0	1.0	Data entry clerk must manually enter each work order labor/material record. Specific task information is rarely entered because of the shear volume of entries.	Workers record all actions taken while still at the point of work. Time and material are recorded automatically. Workers may also create new work orders while in the field.
Totals:	130.0	6.0		
				MasterLink automation doubles or triples supervisory capacity while virtually eliminating the need for manual data input personnel.

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4.3.1.1. Activity/Architecture Diagram

System Activity Diagram

Management

Defines Work Policies, What if query parameters

Receives Effectiveness Reports, Projections of impacts based on queries, et al.

Supervisor

Receives Status Information, Reports, etc.

Approvals/Overrides/ Exceptions

Monitoring Systems

Alerts

MasterLink System

Support Person

Reference Data, Unplanned Work

Receives Status Information, Reports, etc.

Central Office Systems

Interfaces

Skill Worker

Receives Work Schedule/Assignments, Work Execution Aids

Work is Executed

Status Information

CUSTOMERS are Served

System Hardware Architecture Diagram

Management

Hardware Options
- LAN Connected Desktop
- Remote Laptop

Supervisor

Hardware Options
- LAN Connected Desktop
- Remote Laptop

Monitoring Systems

Alerts

MasterLink Server

Hardware Options
- NT Server
- Unix Platforms

Support Person

Hardware Options
- LAN Connected Desktop
- Remote Laptop

Central Office Systems

Interfaces

Skill Worker

Hardware Options
- LAN Connected Desktop
- Remote Laptop
- Remote PDA / Handheld

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JOB STATE TRANSITIONS

Example Job Type

States: Job State 1, Job State 2, Job State 3, Job State 4, Job State 5, Job State 6, Job State 7, Job State 8

Transitions: Create, Approve, Assign, Dispatch, Execute, Pause, Close, Archive, De-assign, Restart

- A series of states and transitions will be defined for each "type" of job to be managed by the system.
- A set of business rules governing each possible transition will be determined. Analysis will include consideration for vertical domain classes.
- System agents will use sets of rules to automate selected transitions. External interfaces will support manual transitions and overrides.
- "Planner" agent will address the generation or creation of jobs containing planned tasks.
- "Scheduler" agent will address the assignment of jobs to resources and time.
- "Dispatcher" agent will handle delivery of work schedules to resources.
- The worker, through a mobile device interface, will be the source for many transitions.
- "Job Manager" agent will act as a communications traffic cop receiving messages, representing events, from the external interfaces (either GUI or system based), from the internal system agents, and from other MasterLink internal classes.

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MasterLink System Software Architecture Diagram
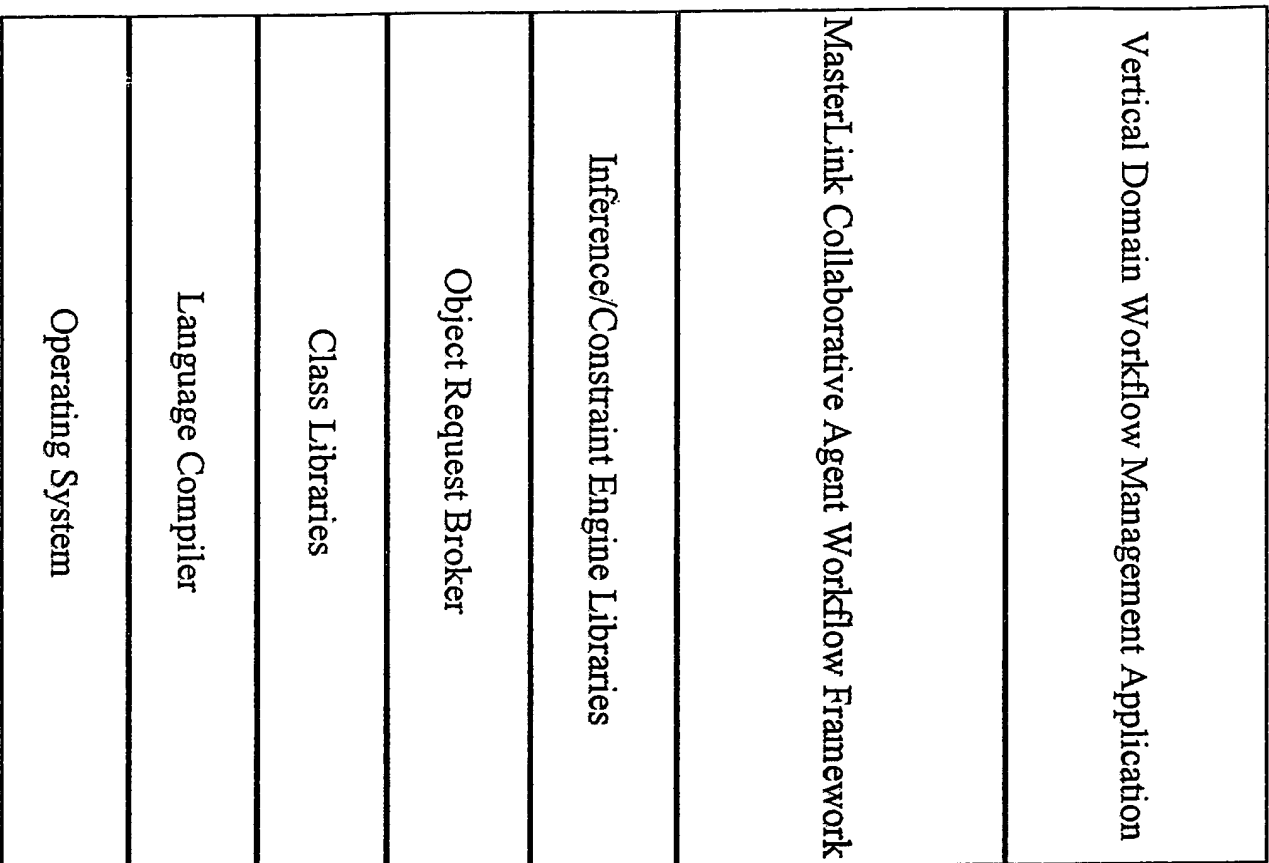
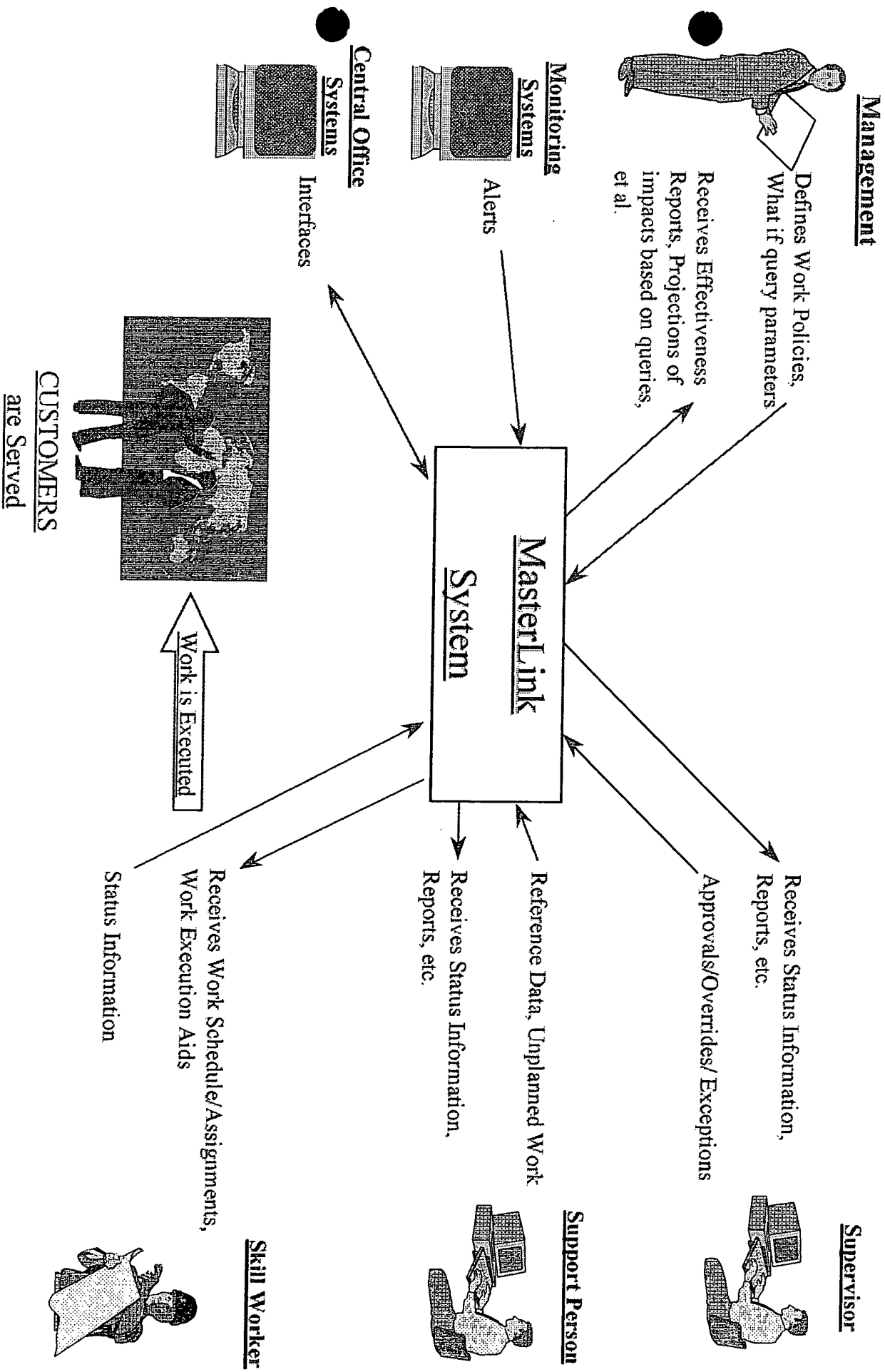|	
Vertical Domain Workflow Management Application	The domain specific objects involved in a physical implementation of a workflow management application based on the MasterLink framework. This includes such things as work management policies, work targets in a classification hierarchy, rules for MasterLink agents, task definitions, job types, job state transitions, and work schedule state transitions. These are specified on a case by case basis as part of the system initialization process, e.g. for a facilities maintenance domain, a home health care domain, etc.
MasterLink Collaborative Agent Workflow Framework	The MasterLink collaborative agents, and the framework of classes supporting these agents which provide the basis for a workflow management application to be built. The relationships between the domain specific objects referred to above and the workflow management agents are defined in this framework. It is the generic representation of a workflow management solution which is the basis for any domain specific implementation to be built.
Inference/Constraint Engine Libraries	The MasterLink agents are implemented as classes that are derived from commercially marketed artificial intelligence products. The ability of a MasterLink agent to use a set of rules or constraints to make a workflow management decision is based on this technology.
Object Request Broker	The mechanism by which distributed instances of application objects can send messages to each other. The support for these distributed objects to communicate over a wireless connection is evolving. Until mature, existing wireless protocols may have to be implemented.
Class Libraries	Depending on the language, these are commercially available libraries fo r common programming functions, such as file i/o, directory services, string handling, date/time functions, and database connectivity.
Language Compiler	The programming language used to implement the application. At this point in time the distributed object oriented options include C++ and Java. This is due to the compatibility requirement with the AI products, Orbs and Databases.
Operating System	The operating system which must be capable of supporting the language and other off the shelf components mentioned above. Typically this is Unix or NT on servers, and clients will vary depending on their type, e.g. a desktop LAN connected client versus a handheld wireless network device.

System Activity Diagram

Management

Defines Work Policies,
What if query parameters

Receives Effectiveness
Reports, Projections of
impacts based on queries,
et al.

**Monitoring
Systems**

Alerts

**Central Office
Systems**

Interfaces

**MasterLink
System**

**CUSTOMERS
are Served**

Work is Executed

Status Information

Receives Work Schedule/Assignments,
Work Execution Aids

Receives Status Information,
Reports, etc.

Reference Data, Unplanned Work

Approvals/Overrides/ Exceptions

Receives Status Information,
Reports, etc.

Skill Worker

Support Person

Supervisor

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MASTERLINK
Work Automation & Simplification

MasterLink Corporation
3649 All American Blvd., Orlando, FL 32810-4726
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April 14, 1998

Mr. Thomas V. Radovich
Director, Commercial Product Development
Lockheed Martin Electronic & Missiles
500 Sand Lake Road MP 040
Orlando, Florida 32819-8907

Dear Tom,

Thank you for meeting with us last Friday for an introduction to MasterLink. As promised enclosed is a clear copy of our power point presentation. The items left with you from our business plan dated April 9,1998, although marked "Confidential" should have been marked "Proprietary Information".

We will be happy to disclose more information to you. Will we need to execute another mutually proprietary agreement with Electronics & Missiles?

It is our desire to have Lockheed Martin in our initial user group. To maximize vertical and horizontal application benefits for your company partnering may be advantageous.

As mentioned during our meeting, a contract management system could be of significant benefit to Lockheed Martin. MasterLink simply requires domain expertise to adapt its facilities workflow process management system to contract management. All we would need is a concise model of a typical contract management flow and some domain expertise specific to the task. With some modifications to the system this product can be made ready for demonstration. Congratulations on wining the huge contract! Wouldn't it be nice to have an automated contract management tool to control it?

The facilities management demonstration prototype we will be presenting to you this fall will clearly show use and value we discussed last Friday. We may be able to move this date forward and will keep you advised.

We sincerely appreciate your willingness to send us a letter concerning MasterLink's automated facilities workflow management system. We are looking forward to receiving it, as your support will be very helpful to us.

Very truly yours,

Kent A. Weisner, Vice President
MasterLink Corporation

cc: Mr. John Hartman, CTO

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Lockheed Martin Electronics & Missiles
5600 Sand Lake Road   Orlando, Florida 32819-8907

FILE

May 28, 1998

Mr. Kent A. Weisner
Vice President
MasterLink Corporation
3649 All American Blvd.
Orlando, FL 32810-4726

Dear Kent,

I appreciate your meeting with us to explain your MasterLink automated facilities workflow management system. Versions of this system may be applicable to a number of functions within our operating unit, including certain facilities and contract management functions. We will be interested in your progress on this product and discussing potential demonstrations when the prototype is ready for "beta" site testing. I wish you success in developing what appears to be an innovative management tool.

Sincerely,

Thomas V. Radovich
Director, Commercial Product Development
Mail Point 040